HC3906

30V N-Channel MOSFET

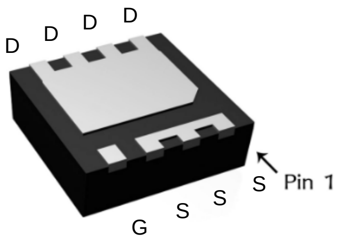
General Description

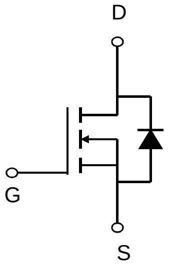
- Latest Trench Power MOSFET technology
- Very Low R_{DS}(on) at 4.5V V_{GS}
- Low Gate Charge
- High Current Capability
- RoHS and Halogen-Free Compliant

Features

V_{DS}	30V
I_D (at V_{GS}=10V)	60A
$R_{DS(ON)}$ (at V_{GS}=10V)	6.0mΩ(Max)
$R_{DS(ON)}$ (at V_{GS}=4.5V)	9.0mΩ(Max)

DFN3*3





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous	TC=25°C	I_D	60	A
	TC=100°C	I_D	38	A
Drain Current – Pulsed		I_{DM}	240	A
Maximum Power Dissipation		P_D	45	W
Junction and Storage Temperature Range		T_J,T_{STG}	-55 To 150	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance junction-case	$R_{θJc}$		2.8	℃ /W
Thermal Resistance junction-to-Ambient	$R_{θJA}$		62	℃ /W

Electrical Characteristics (TJ=25℃ unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V,V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.0	1.6	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=20A		4.8	6.0	mΩ
		V_{GS}=4.5V, I_D=10A		7.0	9.0	mΩ
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{DS}=25V,V_{GS}=0V, F=1.0MHz		1210		pF
C_{oss}	Output Capacitance			190		pF
C_{rss}	Reverse Transfer Capacitance			100		pF
SWITCHING PARAMETERS						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=10V V_{DS}=15V R_L=0.75Ω R_{GEN}=3Ω		7.3		nS
t_r	Turn-on Rise Time			14.5		nS
$t_{d(off)}$	Turn-Off Delay Time			35.8		nS
t_f	Turn-Off Fall Time			9.6		nS
Q_g	Total Gate Charge	V_{DS}=15V,I_D=4.5A, V_{GS}=4.5V		11		nC
Q_{gs}	Gate-Source Charge			1.85		nC
Q_{gd}	Gate-Drain Charge			6.8		nC
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_{SD}=1A		0.72	1.3	V
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz		2.5		Ω

Note：

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

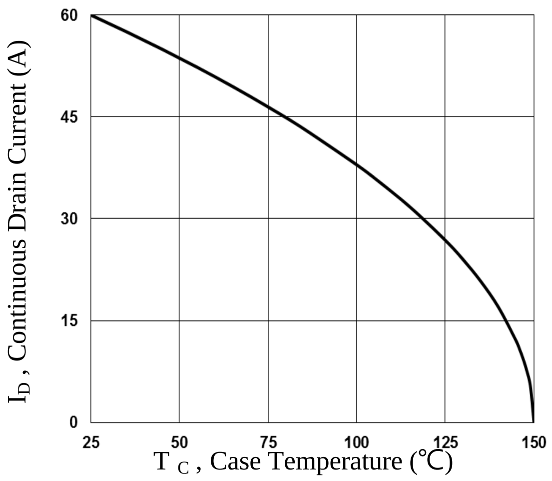


Fig.1 Continuous Drain Current vs. T_C

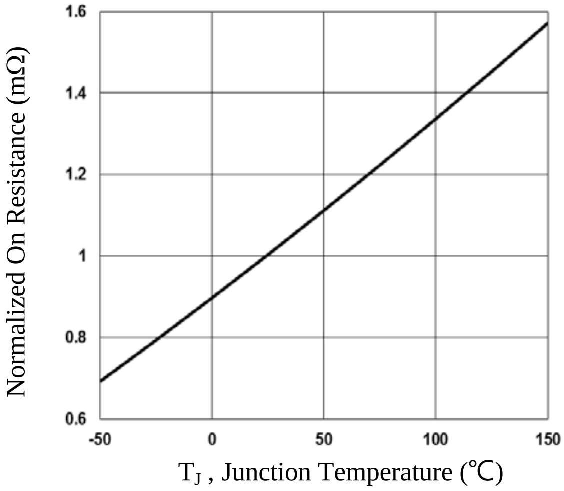


Fig.2 Normalized RDSON vs. T_J

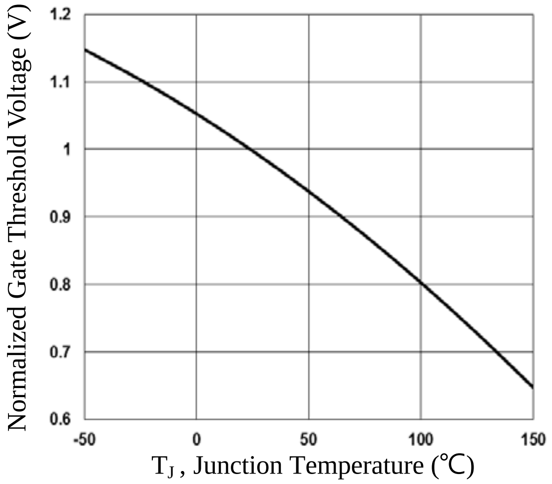


Fig.3 Normalized V_{th} vs. T_J

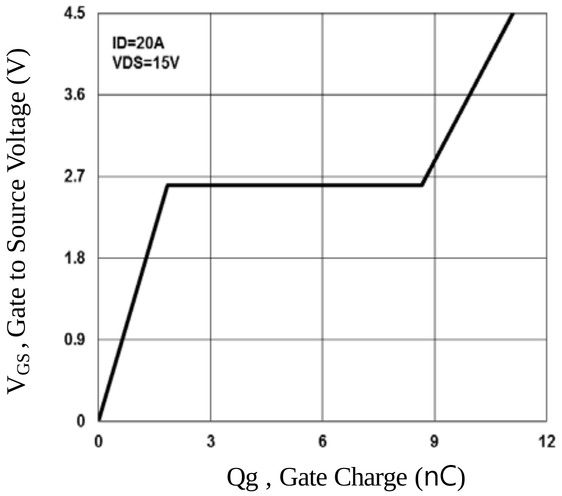


Fig.4 Gate Charge Waveform

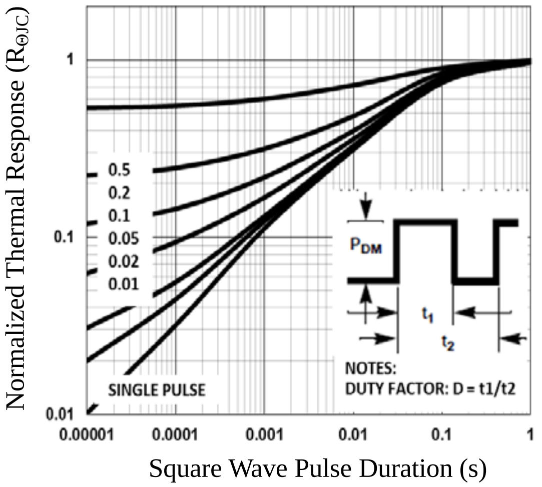


Fig.5 Normalized Transient Impedance

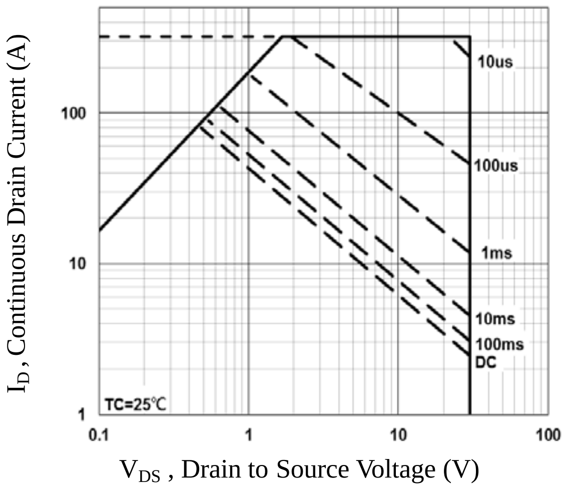


Fig.6 Maximum Safe Operation Area

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

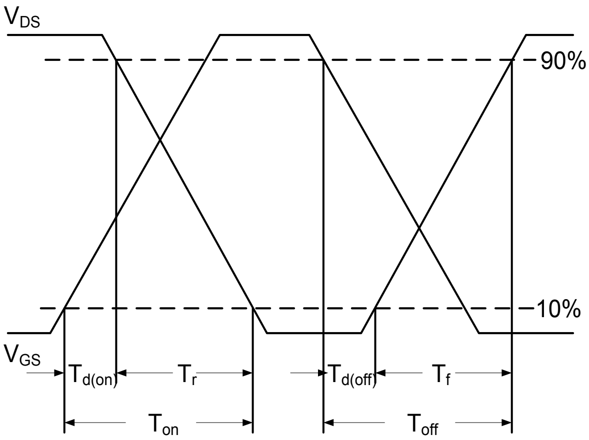


Fig.7 Switching Time Waveform

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

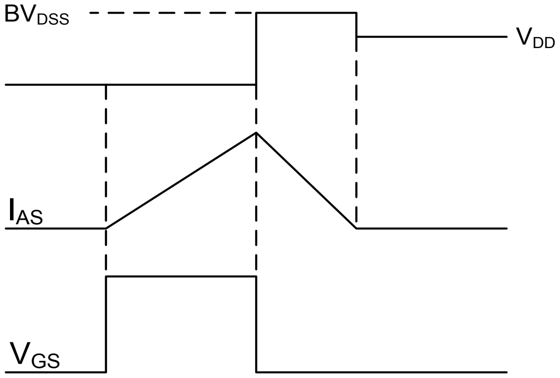
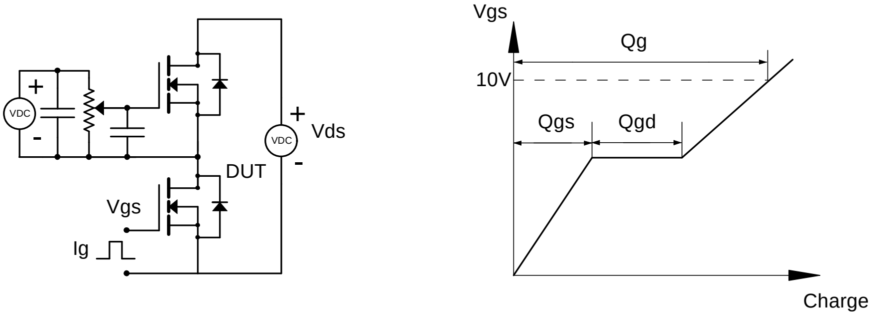
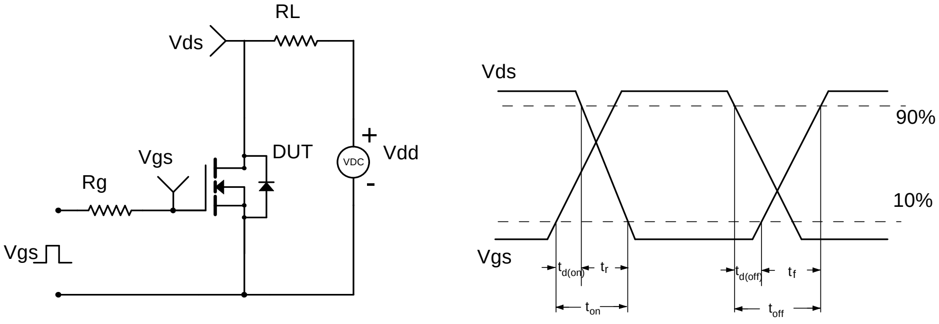


Fig.8 EAS Waveform

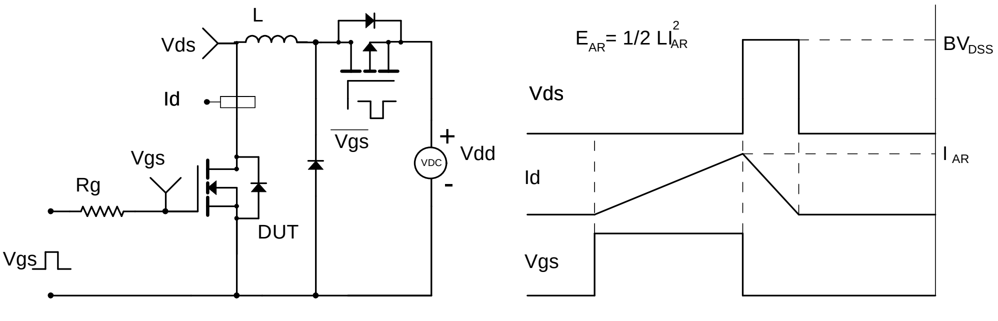
Gate Charge Test Circuit & Waveform



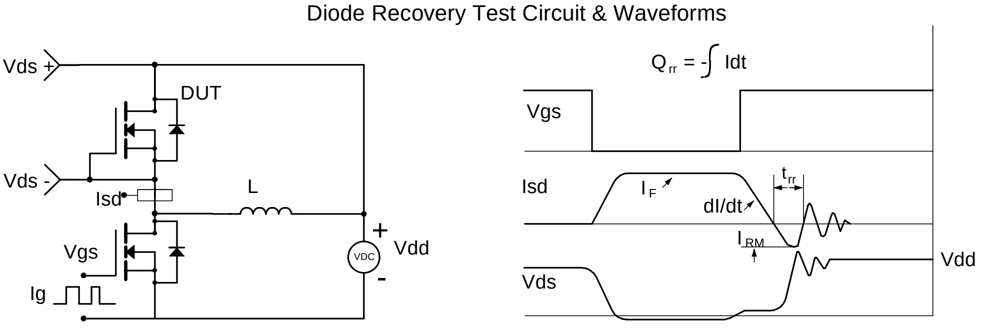
Resistive Switching Test Circuit & Waveforms



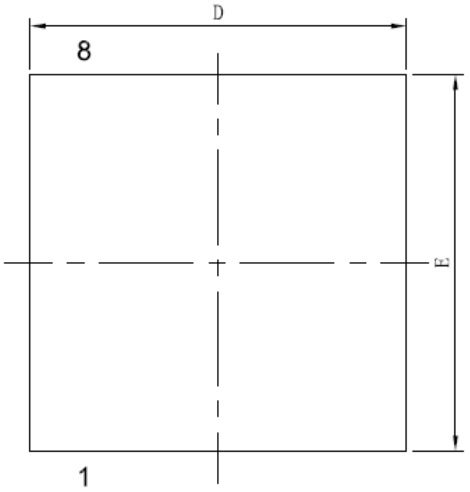
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



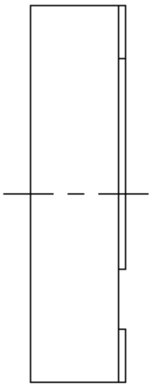
Diode Recovery Test Circuit & Waveforms

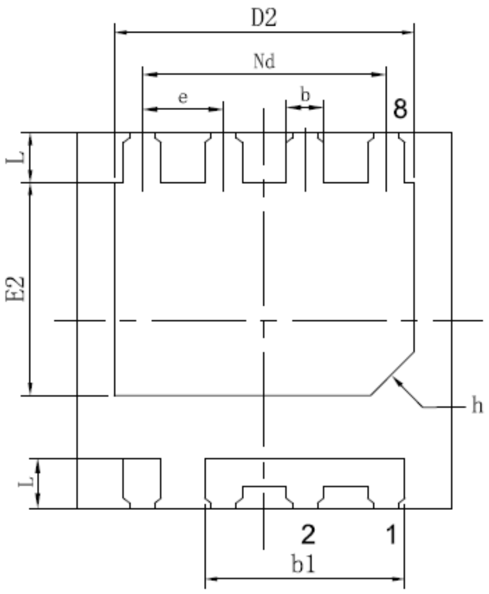


DFN3*3 PACKAGE INFORMATION

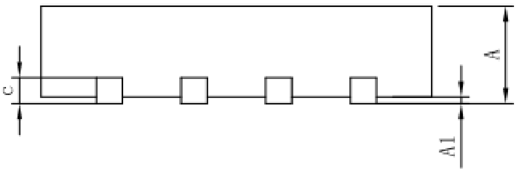


TOP VIEW





BOTTOM VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
b1	1.55	1.60	1.65
c	0.19	0.20	0.21
D	2.90	3.00	3.10
D2	2.30	2.40	2.50
Nd	1.90	1.95	2.00
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
e	0.65BSC		
L	0.35	0.40	0.45
h	0.30	0.35	0.40